

WEEKLY BULLETIN

CALIFORNIA STATE DEPARTMENT OF PUBLIC HEALTH

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GUY P. JONES
Editor

DEFENSE AGAINST CHEMICAL WARFARE

The dangers that lie in gas attacks must be recognized and all health officers should be informed of decontamination methods. The Bureau of Sanitary Inspections has prepared the following notes, based upon lecture courses and publications of the Office of Civilian Defense.

The vulnerability of any community, town or city to gas attack depends largely upon its geographical location and its topographical features. So great is the extent of this Country that its vulnerability will vary greatly with different communities. It may be expected that, in the event of gas attack endangering any community in this Country, the War Department will give timely warning to States which in whole or in part are considered to be in the zone of immediate danger.

But, aside from these considerations, it should be realized that there is necessarily a limitation upon the extent to which gas may be used. Despite the great increases in recent years in the cruising radius and carrying capacity of aircraft, the idea of an airborne gas attack on such a scale as to wipe out the population of a city or even a large proportion of it is still regarded as fantastic.

Even in limited areas, to be highly effective, gas usually must be employed in great quantity. Few nations have the resources in raw materials and manufacturing capacity to wage chemical warfare on such a scale.

Chemical agents which are to be contended with in decontamination:

Physical state

- | | |
|----------------------------------|--------|
| 1. Mustard (HS) (Persistent) | Liquid |
| 2. Lewisite (M-1) (Persistent) | Liquid |
| 3. Chlorine (Cl) (Nonpersistent) | Gas |
| 4. Phosgene (CG) | Gas |
| 5. Chloracetophenone (CN) | Solid |

Decontamination

Decontamination is the process of neutralizing or destroying a chemical agent in areas which have been subjected to it. In general no such measures are necessary following attack with nonpersistent gas since natural phenomena will cause it to disappear quickly. The use of persistent gas, however, will cause liquid contamination of streets and building exteriors and, in the case of direct hits, by bomb or shell, interior contamination of the building will undoubtedly result. Unless proper physical measures are immediately adopted, the chemical agent will remain a source of danger for some considerable time.

Upon the explosion of a mustard gas bomb or shell, part of the chemical will immediately pass off into the atmosphere as a gas. Part of it may be disseminated in the form of fine droplets floating in the air and the remainder will be spattered as a liquid about the bomb or shell crater. In addition to such liquid contamination, materials exposed to mustard gas vapor will absorb the gas and thus become contaminated, and physical decontamination will probably be necessary.

The more volatile nonpersistent "true gases" such as chlorine and phosgene will probably require no manual decontamination. If decontamination is indicated the best method is to treat the affected area with another chemical which reacts with the gas leaving a residue which is harmless or can easily be washed away with water.

Mustard and lewisite will both require decontamination. Lewisite is quite readily disposed of by the use of water but mustard requires a treatment with a compound which will react to produce chlorine and thus neutralize the mustard.

Decontamination work is arduous and dangerous; it requires trained personnel provided with gas masks and protective suits which cover the entire body.

Decontamination materials

Physical agents used for decontamination are either chemicals which react to render harmless chemical agents, or materials which may be used to cover the contaminated area so as to prevent the escape of toxic gas therefrom, at least temporarily.

The principal decontaminating agent for mustard gas is bleaching powder, otherwise known as chloride of lime. This material readily gives up its chlorine when exposed to the air or moisture and chlorine reacts with mustard gas to destroy it, but must be brought into intimate contact with the gas to produce this result.

Chloride of lime should be kept in airtight containers until the moment of its use. This dry bleach should not be placed directly upon the liquid mustard gas because two products of the chemical reaction are heat and flame, which result in driving off a high concentration of mustard vapor which may endanger people who would otherwise be safe. The bleach is either mixed with water (slurry), a paste, or mixed with sand or earth (dry mix).

The greater the percentage of available chlorine in the bleach, the more efficient the result.

If using a compound which varies from the standard of 30 per cent to 35 per cent available chlorine, it is a safe rule to use one part of bleach to one part of inert material for each 10 per cent of available chlorine; thus, with one part of 70 per cent H. T. H. or Perchloron, seven pounds of earth may be used; with one pound of 30 per cent commercial chloride of lime, three pounds of earth may be used; or with one pound of 10 per cent chloride, one pound of earth may be used.

Slurry is a fifty-fifty mixture of chloride of lime and water. These proportions are by weight. Thus, two gallons of water weighing 16 pounds will require three shovelfuls of bleach weighing approximately 16 pounds. Thorough mixture to prevent lumping is essential. To the 16 pounds of chloride of lime add approximately two quarts of water and work to a smooth paste; then add remaining water and stir thoroughly.

The decontamination of one square yard of area will require approximately one pound of chloride of lime; thus, each filling of a three-gallon sprayer will properly treat from 16 to 20 square yards. This material is highly corrosive to metals and cotton fabrics and this should be borne in mind where corrosive action will cause excessive damage.

Cold water has little if any effect on mustard gas except that if applied with pressure it will tend to drain the substance away. Care must be exercised to avoid unnecessary spattering of the liquid mustard and subsequent contamination of surfaces not already affected. Hot water is fairly effective. Mustard gas is heavier than water and will lie at the bottom of pools and puddles retaining its lethal effect for a long period of time, though the water over it will retard the escape of toxic vapors. Water, either hot or cold, causes lewisite to hydrolyze quickly and results in its destruction. The solid residue which remains is dangerous to touch though it gives off no gas. Even after long decontamination of a lewisite area it is dangerous to sit or lie down on the decontaminated surface. After treatment with water, such a surface should be covered with a layer of earth, sand, or ashes. Articles such as tools contaminated with lewisite which are to be handled should be treated with an alkali such as sodium hydroxide.

Earth, sand, ashes or sawdust may be spread over a contaminated area to give temporary protection. This covering should be at least three inches thick. Such covering acts only as a seal to prevent for a limited time the escape of toxic vapors. If practicable, the covering should be thoroughly wet with water.

Sodium sulphide: This chemical prepared as a 1 per cent solution with water reacts to destroy mustard gas, but somewhat more slowly than chloride of lime; it has the advantage of not releasing mustard vapor since no heat is evolved in the chemical reaction. The solution is more effective if heated. It may be used either as a spray or mixed with sand in a proportion of one part by weight of solution to four by weight of sand. Proper decontamination of each square yard of area will require the use of six gallons of sodium sulphide solution.

The Green solution, which derives its name from its greenish color, is prepared by dissolving one pound of bicarbonate of soda in one gallon of commercial hypochlorite solution. This material is less efficient for the destruction of mustard gas than bleaching powder, but is also less corrosive to metals. It should be generously used by swabbing with a sponge or rag.

Decontamination is accomplished by:

1. Destroying the chemical agent through reaction with other chemicals.
2. Burning.
3. Removal of the chemical agent by flushing it away.
4. Covering the chemical agent with a seal, allowing natural phenomena to subsequently destroy it.

Burning

Articles of small value or grossly contaminated articles which are not practicable to decontaminate should be disposed of by fire or by deep burial. If such articles are burned, great care should be exercised to prevent persons from coming in contact with the highly lethal fumes which will be driven off. Areas of dry grass and underbrush may thus be decontaminated.

General surfaces to be decontaminated:

1. Ground
2. Streets
3. Walls and floors
4. Metal equipment
5. Clothing
6. Mobile equipment

Ground

Small areas of ground contaminated with mustard gas may be treated by spreading dry mix over them and spading this material into the soil. One pound of bleach is required per square yard of contaminated area. If bleach is not available, the contaminated area should be covered with wet earth or sand.

(Continued in next issue)

DISTRICT PEDIATRICIAN APPOINTED

Dr. Charlotte Singer-Brooks has been appointed district pediatrician for the northeastern counties to fill a vacancy, and will maintain headquarters in Sacramento. She has been District Health Officer in the Santa Barbara County Department of Health since April, 1941. Prior to going to Santa Barbara County Dr. Brooks was associated with the Sacramento City Health Department for a short time. She received her public health degree from the University of Michigan and her M.D. degree from the University of Illinois, where she did research work in the communicable disease field in conjunction with the Illinois State Department of Health. She took her internship at the Los Angeles County Hospital and two years of residency in the pediatrics and communicable disease departments of Children's Hospital in San Francisco. Following this she was on the staff of the pediatrics department of the University of California Medical School for five years and was associate at Hooper Foundation for the same period.

The truth is that the world's center of cultural, economic and political gravity has, after 450 years, at last sailed after Columbus across the Atlantic. The responsibility of the United States should be equal to its power.—Krishnalal Shridharani.

CRIPPLED CHILD A WAR HERO

Shortly after the California law that provides for the treatment of physically handicapped children became effective, the judge of a superior court in a California county certified to the State Department of Public Health that a six-year-old boy who had been severely injured in an automobile accident was in need of surgical treatment to remove a physical handicap that occurred as a result of the accident.

The department thereupon placed the child under treatment which covered an extended period and involved many serious and difficult operations upon one of the patient's legs. While undergoing these operations, which covered a period of many years, the boy studied assiduously and took such odd jobs as he was able to perform in his handicapped condition. He saved his money, however, and was able, through his savings, to attend the university for two years. When his funds became exhausted at the end of this time, he joined the Civilian Conservation Corps where he worked hard, saved his meager funds and was able to return to the university and be graduated as a communications engineer.

Immediately following his graduation, he became employed with the telephone company. He tried to join the Army, but was rejected for the reason that one leg was shorter than the other. He then asked to be put on line work climbing poles to exercise the deformed leg, which he believed was beneficial. After a time it seemed to him that both legs were of equal length and, after examination, he was taken into the Navy and became paymaster on the carrier *Hornet* which was destroyed in the South Pacific. After destruction of the carrier, he swam for a long period of time guiding a raft which held three unconscious, injured seamen. For his bravery in this undertaking, he was given a citation by the U. S. Navy.

The cost of the treatment for this case under the Crippled Child Act was less than \$2,000, which in the end, as required by law, was paid by the county in which he resided. It would seem, therefore, that this relatively small sum of money expended by the county under supervision of the State has been an essential factor in the development of one of the outstanding heroes of our war in the Pacific.

The new democracy will give us freedom such as we have never known, but only if as individuals we perform our duties with willing hearts. It will be an adventure in sharing—sharing of duties and responsibilities and sharing of the joy that can come from the give-and-take of human contacts and fruitful daily living.—Henry A. Wallace.

MORBIDITY*

Complete Reports for Certain Diseases Recorded for Week
Ending February 20, 1943

Chickenpox

1955 cases from the following counties: Alameda 191, Butte 3, Contra Costa 6, Fresno 81, Kern 16, Kings 41, Los Angeles 496, Marin 31, Mendocino 3, Modoc 17, Monterey 22, Napa 11, Orange 92, Plumas 2, Riverside 1, Sacramento 73, San Bernardino 54, San Diego 255, San Francisco 136, San Joaquin 117, San Luis Obispo 16, San Mateo 28, Santa Barbara 31, Santa Clara 47, Santa Cruz 13, Solano 57, Sonoma 18, Sutter 2, Tulare 79, Tuolumne 3, Ventura 6, Yolo 1, Yuba 6.

German Measles

831 cases from the following counties: Alameda 81, Contra Costa 6, Fresno 8, Los Angeles 265, Marin 2, Modoc 7, Mono 2, Monterey 5, Napa 7, Orange 49, Sacramento 23, San Bernardino 5, San Diego 188, San Francisco 67, San Joaquin 11, San Luis Obispo 7, San Mateo 11, Santa Barbara 20, Santa Clara 43, Santa Cruz 7, Solano 2, Sonoma 4, Sutter 1, Ventura 6, Yolo 4.

Measles

432 cases from the following counties: Alameda 38, Butte 2, Colusa 1, Contra Costa 5, Fresno 4, Kern 7, Los Angeles 117, Marin 48, Modoc 43, Monterey 1, Orange 4, Plumas 1, Sacramento 14, San Bernardino 6, San Diego 41, San Francisco 42, San Joaquin 3, San Luis Obispo 1, San Mateo 13, Santa Barbara 3, Santa Clara 15, Solano 9, Sutter 1, Tulare 6, Ventura 5, Yolo 1, Yuba 1.

Mumps

701 cases from the following counties: Alameda 40, Butte 1, Contra Costa 6, Fresno 16, Glenn 7, Kern 25, Kings 58, Los Angeles 189, Marin 3, Modoc 3, Monterey 9, Napa 4, Orange 32, Plumas 1, Sacramento 10, San Bernardino 2, San Diego 114, San Francisco 44, San Joaquin 59, San Mateo 31, Santa Barbara 1, Santa Clara 26, Santa Cruz 3, Siskiyou 1, Solano 7, Sutter 1, Tulare 2, Tuolumne 2, Yolo 3, Yuba 1.

Scarlet Fever

175 cases from the following counties: Alameda 9, Butte 1, Fresno 6, Kern 5, Kings 3, Los Angeles 69, Marin 9, Napa 1, Orange 4, Placer 1, Sacramento 8, San Bernardino 6, San Diego 7, San Francisco 19, San Joaquin 2, San Mateo 3, Santa Clara 7, Solano 5, Tulare 1, Tuolumne 1, Ventura 2, Yuba 6.

Whooping Cough

356 cases from the following counties: Alameda 60, Kern 14, Kings 1, Los Angeles 178, Marin 1, Modoc 1, Monterey 2, Orange 7, Sacramento 4, San Diego 34, San Francisco 16, San Joaquin 4, San Luis Obispo 2, San Mateo 3, Santa Clara 2, Santa Cruz 5, Solano 7, Tulare 11, Ventura 4.

Diphtheria

16 cases from the following counties: Los Angeles 6, Placer 1, Sacramento 3, San Bernardino 1, San Francisco 2, San Joaquin 2, Yuba 1.

Epilepsy

48 cases from the following counties: Alameda 3, Los Angeles 33, Marin 1, Napa 1, Sacramento 2, San Francisco 7, Sonoma 1.

Coccidioidal Granuloma

One case from Kern County.

Dysentery (Bacillary)

13 cases from the following counties: Los Angeles 10, Sonoma 3.

Encephalitis (Infectious)

One case from Kings County.

Food Poisoning

101 cases from the following counties: Monterey 100, San Luis Obispo 1.

Influenza (Epidemic)

85 cases reported in the State.

Jaundice (Infectious)

7 cases from the following counties: Alameda 1, Napa 1, Sutter 1, Yolo 4.

Malaria

One case from Yuba County.

Meningitis (Meningococcic)

26 cases from the following counties: Alameda 2, Fresno 3, Los Angeles 2, Monterey 1, Napa 2, Sacramento 4, San Diego 1, San Francisco 4, San Joaquin 2, Santa Barbara 1, Tulare 1, Ventura 2, Yuba 1.

* Data regarding the other reportable diseases not listed herein, may be obtained upon request.

Pneumonia (Infectious)

82 cases reported in the State.

Poliomyelitis (Acute Anterior)

8 cases from the following counties: Kern 1, Los Angeles 6, San Francisco 1.

Rabies (Animal)

6 cases from Los Angeles County.

Rheumatic Fever (Acute)

4 cases from the following counties: Marin 2, Plumas 1, Siskiyou 1.

Trichinosis

One case from San Francisco.

Typhoid Fever

One case from Los Angeles County.

Typhus Fever

One case from Los Angeles County.

Undulant Fever

2 cases from Fresno County.

Gonorrhea

172 cases reported in the State.

Syphilis

457 cases reported in the State.

STAFF MEMBERS AT WAR

The following members of the staff of the California State Department of Public Health are engaged in war services:

Helen Ackley, P.H.N.
Ray Atkinson, M.D.
Lloyd Bascom
Paul Billings
Alcor Browne
Donald Budie
O. L. Butterfield
Ida May Carlston, P.H.N.
Beckwith Clark
Jules Comroe, M.D.
Leon Comroe, M. D.
Joseph Copeland, M.D.
John Cruzan
Sidney F. Dommes, Jr.
Robert Dyar, M.D.
Tom Enright
Morris Farrell
J. J. Fitzgerald, M.D.
Lowell D. Ford, M.D.
Herbert Foster, Jr.
Lyman D. Heacock, D.D.S.
Horace Hancock
R. W. Haymond
Donald Helgren
D. D. Holaday, M.D.

Jack T. Hubbard
George Husser, M.D.
Wm. T. Ingram
Homer W. Jorgensenu
James R. Keefer
Hubert W. Keltner
Francis J. Lenehan
Edward Maher, M.D.
Rollyn E. Malde
E. B. Mansfield
Howard Marriott
John S. Martin
Charles Meisenbach
Reid Nunn
Richard F. Peters
Charles Pokorny, M.D.
Jack W. Pratt
Donald Roberts
Fred Rohl
Robert E. Ryan
Julius R. Scholtz, M.D.
Jack Schorr
Joseph B. Smith
Lillian Wurzel

